Sultan Qaboos University - College of Science
Department of Mathematics and Statistics
Foundation Programme
Basic Mathematics - Sample test

Instructions:

- This test contains 40 multiple choice questions.
- Answer all questions. Time allowed is 90 minutes.
- Mark the answers on the multiple choice answer sheet using a $2HB$ pencil.
- Rough work done on the given extra sheet will not be graded.
- All exam materials should be returned after the exam.

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1. Simplify the expression: $\sqrt[3]{27x^3y^6}$

   (A) $3xy^2$ **(B)** $9xy^2$ **(C)** $6xy^2$ **(D)** None of these

2. The expression $(3x^2y^3)^{-3}$ is equal to

   (A) $27x^{-6}y^{-9}$ **(B)** $\frac{1}{27}x^{-1}y$ **(C)** $\frac{1}{27x^6y^9}$ **(D)** None of these

3. If $A = \{3, 4, \pi\}$ and $B = \{5, 6, \frac{22}{7}\}$ then $A \bigcap B$ is

   (A) $\{\pi\}$ **(B)** $\{\frac{22}{7}\}$ **(C)** $\{\pi, \frac{22}{7}\}$ **(D)** $\emptyset$

4. Express the interval $(-\infty, 2)$ in terms of inequality:

   (A) $\{x|x \leq 2\}$ **(B)** $\{x|x \geq 2\}$ **(C)** $\{x|-2 \leq x \leq 2\}$ **(D)** None of these

5. Express the inequality $3 > x > -5$ in interval notation:

   (A) $x \in (3, -5)$ **(B)** $x \in (-5, 3)$ **(C)** $x \in [3, -5]$ **(D)** $x \in [-5, 3]$

6. Perform the indicated operation and simplify: $(t-2)(t+2) + (4-t)^2$

   (A) $2(t^2 - 4)$ **(B)** 0 **(C)** $2(4 - t^2)$ **(D)** None of these

7. Simplify the expression: $\frac{1}{x^2 - 2x - 3} - \frac{1}{x - 3}$

   (A) $\frac{x}{(x-3)(x+1)}$ **(B)** $\frac{x}{(x-3)(x-1)}$ **(C)** $\frac{x}{(3-x)(x+1)}$ **(D)** $\frac{x}{(3-x)(x-1)}$

8. Simplify the expression: $\dfrac{x^{-2}+y^{-2}}{x^{-2}y^{-2}}$

(A) x^2+y^2 **(B)** $x^{-2}+y^{-2}$ **(C)** $\dfrac{1}{x^2+y^2}$ **(D)** $\dfrac{1}{x^{-2}+y^{-2}}$

9. If 112 students passed an exam out of 160 students, what percentage of students fail?

(A) 40% **(B)** 35% **(C)** 30% **(D)** None of these

10. 12×10^{-6} is

(A) 0.00012 **(B)** 0.000012 **(C)** 0.0000012 **(D)** None of these

11. Rationalize the denominator: $\dfrac{1}{\sqrt{\pi}-3}$

(A) $\frac{1}{8}(3+\sqrt{\pi})$ **(B)** $-\frac{1}{8}(3+\sqrt{\pi})$ **(C)** $\frac{1}{2}(3+\sqrt{\pi})$ **(D)** None of these

12. Find the quotient Q and remainder R using long division: $\dfrac{6x^2-x+4}{3x+1}$

(A) $Q=2x+1,\quad R=5$ **(C)** $Q=2x-1,\quad R=5$
(B) $Q=2x-1,\quad R=3$ **(D)** None of these

13. Solution to $x+\dfrac{x}{2}+\dfrac{x}{3}=11$ is

(A) 11 **(B)** 10 **(C)** 9 **(D)** 6

14. Simplify: $\dfrac{5(x+4)(x-3)^2-3(x+4)^2(x-3)}{(x-3)(x+4)}$

(A) $\dfrac{2x-27}{(x-3)(x+4)}$ **(B)** $\dfrac{-27}{(x-3)(x+4)}$ **(C)** $\dfrac{2x-3}{(x-3)(x+4)}$ **(D)** None of these

15. Find all solution to the equation $x^2+2x+4=0$.

(A) 2 **(B)** -2 **(C)** 2 & -2 **(D)** None of these

16. Write the given number in scientific notation: 0.000526

(A) 5.26×10^{-4} **(B)** 5.26×10^{-3} **(C)** 52.6×10^{-6} **(D)** None of these

17. Ibrahim is 30 years older than Ahmed. After 5 years Ibrahim will be three times as old as Ahmed. How old is Ahmed?

(A) 12 **(B)** 11 **(C)** 10 **(D)** 9

18. Find the solution to $\dfrac{1}{2}<\dfrac{2-3x}{4}$.

(A) $x\in(-\infty,0)$ **(B)** $x\in(-\infty,1]$ **(C)** $x\in(1,\infty)$ **(D)** $x\in[1,\infty)$

19. Find $f(-2)+f(2)$ if
$$f(x)=\begin{cases} x^2+2x-3, & x<-1 \\ x^2-2x+2, & x\geq -1 \end{cases}.$$

(A) 1 **(B)** -1 **(C)** 0 **(D)** 2

20. Let $f(x)=x^2+2$ and $g(x)=x-1$, then $f(g(x))$ is equal to

(A) x^2-2x+3 **(B)** x^2+1 **(C)** x^2-1 **(D)** None of these

21. $|2-\sqrt{5}|+|\sqrt{3}-2|=$

(A) $\sqrt{3}-\sqrt{5}$ **(B)** $\sqrt{5}-\sqrt{3}$ **(C)** $\sqrt{5}+\sqrt{3}+4$ **(D)** None of these

22. $|x-6|=-5$ has solution(s)

(A) $x=11$ **(B)** $x=1$ **(C)** $x=11\,\&\,x=1$ **(D)** None of these

23. The slope of the line $x=-1$ is

(A) 0 **(B)** 1 **(C)** -1 **(D)** None of these

24. The radius of the circle $x^2+y^2+2x=0$ is

(A) 2 **(B)** 1 **(C)** 3 **(D)** None of these

25. The center of the circle $x^2+y^2+4x+4y=1$ is

(A) $(2,2)$ **(B)** $(-2,-2)$ **(C)** $(4,4)$ **(D)** $(-4,-4)$

26. The equation of the line with zero slope and $y-$intercept 2 is

(A) $x=2$ **(B)** $x=-2$ **(C)** $y=2$ **(D)** $y=-2$

27. If 1 stone = 14 pounds, and 1 kilogram = 2.2 pounds, how many stones is 42 kilograms?

(A) 4.4 **(B)** 8.8 **(C)** 6.6 **(D)** None of these

28. If 1 furlong = 220 yards, 1 yard = 3 feet, 1 foot = 12 inches, which is the biggest measurement?

(A) 1 furlong **(B)** 219 yards **(C)** 8000 inches **(D)** 661 feet

29. The slope of the line joining the points $(2,3)$ and $(-3,18)$ is

(A) 3 **(B)** -3 **(C)** -15 **(D)** 15

30. The graph of $y = (x-1)^2$ is symmetric about

(A) $y-$ axis **(B)** $x = 1$ **(C)** $x = -1$ **(D)** $x-$ axis

31. The line $y + 2x + 1 = 0$ is perpendicular to the line

(A) $x - 2y + 7 = 0$ **(B)** $x + 2y - 1 = 0$ **(C)** $y - 2x - 1 = 0$ **(D)** $y + 2x - 1 = 0$

32. If $\sin x = \dfrac{12}{13}$, $\cot x$ is

(A) $\dfrac{12}{5}$ **(B)** $\dfrac{5}{12}$ **(C)** $\dfrac{13}{5}$ **(D)** $\dfrac{5}{13}$

33. $\sin\left(\frac{\pi}{2} + x\right) + \cos\left(\frac{\pi}{2} + x\right)$ can be simplified as

(A) $\cos x + \sin x$ **(B)** $\sin x - \cos x$ **(C)** $\cos x - \sin x$ **(D)** None of these

34. Simplify: $\dfrac{\cot x}{\csc x}$

(A) $\sin x$ **(B)** $\cos x$ **(C)** $\sec x$ **(D)** $\tan x$

35. The period of $f(x) = \tan(3x)$ is

(A) $\dfrac{2\pi}{3}$ **(B)** 6π **(C)** 3π **(D)** $\dfrac{\pi}{3}$

36. The phase shift of $f(x) = \sin\left(\dfrac{x}{2} - \pi\right)$ is

(A) $-\pi$ **(B)** π **(C)** 2π **(D)** -2π

37. The expression $2\sec^2 x + 2\cos^2 x - 2\tan^2 x + 2\sin^2 x$ simplifies to

(A) 2 **(B)** 0 **(C)** -4 **(D)** 4

38. The radian measure of $11.25°$ is

(A) $\dfrac{\pi}{4}$ **(B)** $\dfrac{\pi}{8}$ **(C)** $\dfrac{\pi}{16}$ **(D)** None of these

39. In a triangle, let a, b and c be the sides opposite to the angles A, B and C respectively. Use the *Law of cosine* to find B if $a = 1$, $b = \sqrt{3}$ and $c = 2$.

(A) $30°$ **(B)** $60°$ **(C)** $45°$ **(D)** $90°$

40. A 25 meter tree casts a shadow that is $25\sqrt{3}$ meters long. What is the angle of elevation of the Sun?

(A) $60°$ **(B)** $40°$ **(C)** $30°$ **(D)** $45°$
